Claims:

Following is a complete listing of the claims pending in the application.

1. (Original) A method of depositing a material on a plurality of microfeature workpieces held in a spaced relationship within an enclosure of a processing system, the enclosure including a first precursor gas and having a first enclosure pressure, the method comprising:

reducing pressure within the enclosure to a second enclosure pressure while introducing a flow of a purge gas into the enclosure at a first flow rate, the second enclosure pressure being less than the first enclosure pressure, the processing system having a base pressure at the first flow rate, and a difference between the second enclosure pressure and the first enclosure pressure being at least 90% of the difference between the base pressure and the first enclosure pressure; and

after reducing the pressure within the enclosure to the second enclosure pressure, increasing flow rate of the purge gas to a second flow rate and increasing the pressure within the enclosure to a third enclosure pressure, the second flow rate being greater than the first flow rate and the third enclosure pressure being greater than the second enclosure pressure.

2. (Original) The method of claim 1 wherein the first flow rate is no greater than about 250 sccm.

3. (Original) The method of claim 1 wherein the first flow rate is between about 50 sccm and about 250 sccm.

4. (Original) The method of claim 1 wherein the second flow rate is at least about 1000 sccm.

5. (Original) The method of claim 1 wherein the second flow rate is at least about four times the first flow rate.

6. (Original) The method of claim 1 wherein the third enclosure pressure is at least about nine times the second enclosure pressure.

7. (Original) The method of claim 1 wherein the flow rate of the purge gas is increased to the second flow rate promptly upon reaching the second enclosure pressure.

8. (Original) The method of claim 1 further comprising, after increasing the pressure within the enclosure to the third enclosure pressure, introducing a flow of a second precursor gas to the enclosure with the pressure within the enclosure at a fourth enclosure pressure, a difference between the third enclosure pressure and the fourth enclosure pressure being about 0-10% of the fourth enclosure pressure.

9. (Original) The method of claim 8 wherein the fourth enclosure pressure is approximately equal to the first enclosure pressure.

10. (Original) The method of claim 8 wherein the third enclosure pressure is approximately equal to the fourth enclosure pressure.

11. (Original) The method of claim 8 further comprising, after introducing the flow of the second precursor gas:

terminating the flow of the second precursor gas;

reducing pressure within the enclosure to the second enclosure pressure while introducing a flow of a purge gas into the enclosure at the first flow rate; and

increasing flow rate of the purge gas to the second flow rate and increasing the pressure within the enclosure to the third enclosure pressure.

12. (Original) The method of claim 8 further comprising, after introducing the flow of the second precursor gas:

terminating the flow of the second precursor gas;

reducing pressure within the enclosure to a fifth enclosure pressure while introducing a flow of a purge gas into the enclosure at the first flow rate, a difference between the fifth enclosure pressure and the first enclosure pressure being at least 90% of the difference between the base pressure and the first enclosure pressure and the fifth enclosure pressure being different from the second enclosure pressure; and

increasing flow rate of the purge gas to the second flow rate and increasing the pressure within the enclosure to a sixth enclosure pressure, a difference between the sixth enclosure pressure and the fourth enclosure pressure being about 0-10% of the fourth enclosure pressure.

13. (Cancelled)

14. (Previously presented) The method of claim 18 wherein the first flow rate is at least about 50 sccm.

15. (Previously presented) The method of claim 18 wherein the second flow rate is at least about 2000 sccm.

16. (Previously presented) The method of claim 18 wherein the third enclosure pressure is at least about nine times the second enclosure pressure.

17. (Previously presented) The method of claim 18 wherein the flow rate of the purge gas is increased to the second flow rate promptly upon reaching the second enclosure pressure.

18. (Previously presented) A method of depositing a material on a microfeature workpiece, comprising:

positioning a plurality of microfeature workpieces within an enclosure of a processing system, each of the microfeature workpieces having a surface;

exposing the surfaces of the microfeature workpieces to a first precursor gas at a first enclosure pressure to allow at least a monolayer of the first precursor gas to be adsorbed on the surfaces of the microfeature workpieces;

reducing pressure within the enclosure to a second, lower enclosure pressure in a pump-down process, the pump-down process comprising withdrawing gas from the enclosure while introducing a purge gas at a first flow rate of no greater than about 250 sccm for a first period of time, the pump-down process reducing a partial pressure of the first precursor gas within the enclosure; and

after the pump-down process, purging the enclosure in a purge process, the purge process comprising introducing the purge gas at a second flow rate of at least about 1000 sccm for a second period of time and allowing the enclosure pressure to increase to a third enclosure pressure that is greater than the second enclosure pressure;

wherein the processing system has a base pressure at the first flow rate and a difference between the second enclosure pressure and the first enclosure pressure being at least 90% of the difference between the base pressure and the first enclosure pressure.

19. (Previously presented) The method of claim 18 wherein the partial pressure of the first precursor gas within the enclosure decreases at a first rate profile during the pump-down process and the partial pressure of the first precursor gas decreases at a second rate profile during the purge process, the first rate profile having an initial rate and a terminal rate, the initial rate being substantially greater than the second rate and the second rate being greater than the terminal rate.

20. (Previously presented) The method of claim 18 wherein the partial pressure of the first precursor gas within the enclosure is decreased at least two orders of magnitude during the pump-down process.

21. (Previously presented) The method of claim 18 further comprising, after the purge process, exposing the surfaces of the microfeature workpieces to a second precursor gas at a fourth enclosure pressure, a difference between the third enclosure pressure and the fourth enclosure pressure being about 0-10% of the fourth enclosure pressure.

22. (Withdrawn) The method of claim 21 wherein the fourth enclosure pressure is approximately equal to the first enclosure pressure.

23. (Withdrawn) The method of claim 21 wherein the third enclosure pressure is approximately equal to the fourth enclosure pressure.

24. (Withdrawn) The method of claim 21 further comprising, after exposing the surfaces of the microfeature workpieces to the second precursor gas, repeating the pump-down process to reduce a partial pressure of the second precursor gas within the enclosure, then repeating the purge process.

25. (Withdrawn) The method of claim 21 wherein the pump-down process is a first pump-down process and the purge process is a first purge process, further comprising, after exposing the surfaces of the microfeature workpieces to the second precursor gas, carrying out a second pump-down process to reduce a partial pressure of the second precursor gas within the enclosure then carrying out a second purge process, the second pump-down process continuing for a third period of time that differs from the first period of time.

26. (Withdrawn) A method of depositing titanium nitride on a microfeature workpiece, comprising:

positioning a plurality of microfeature workpieces in a spaced relationship within an enclosure of a processing system, each of the microfeature workpieces having a surface;

introducing a flow of a first precursor gas to the enclosure to expose the surfaces of the microfeature workpieces to the first precursor gas at a first enclosure pressure and allowing at least a monolayer of the first precursor gas to be adsorbed on the surfaces of the microfeature workpieces, the first precursor gas comprising titanium;

reducing pressure within the enclosure by withdrawing gas from the enclosure with a vacuum while introducing a purge gas at a first flow rate of no greater than about 250 sccm for a first period of time to reduce the pressure within the enclosure to a second, lower enclosure pressure and to decrease a partial pressure of the first precursor gas within the enclosure, the processing system having a base pressure at the first flow rate and a difference between the second enclosure pressure and the first enclosure pressure being at least 90% of the difference between the base pressure and the first enclosure pressure;

upon reaching the second enclosure pressure, purging the enclosure by withdrawing gas from the enclosure with a vacuum while introducing the purge gas at a second flow rate of at least 1000 sccm for a second period of time and allowing the enclosure pressure to increase to a third enclosure pressure that is greater than the second enclosure pressure and to further decrease the partial pressure of the first precursor gas within the enclosure; and

after reaching the third enclosure pressure, exposing the surfaces of the microfeature workpieces to a second precursor gas at a fourth enclosure pressure, a difference between the third enclosure pressure and the fourth enclosure pressure being about 0-10% of the fourth enclosure pressure, the second precursor gas comprising nitrogen.

27. (Withdrawn) The method of claim 26 further comprising, after exposing the surfaces of the microfeature workpieces to the second precursor gas:

reducing pressure within the enclosure by withdrawing gas from the enclosure with the vacuum while introducing the purge gas at a third flow rate of no

greater than about 250 sccm for a third period of time to reduce the pressure within the enclosure to a fifth enclosure pressure and to decrease a partial pressure of the second precursor gas within the enclosure, the processing system having a second base pressure at the third flow rate and a difference between the fifth enclosure pressure and the fourth enclosure pressure being at least 90% of the difference between the second base pressure and the fourth enclosure pressure; and

upon reaching the fifth enclosure pressure, purging the enclosure by withdrawing gas from the enclosure with a vacuum while introducing the purge gas at a fourth flow rate of at least 1000 sccm for a second period of time and allowing the enclosure pressure to increase to a sixth enclosure pressure that is greater than the fifth enclosure pressure and to further decrease the partial pressure of the second precursor gas within the enclosure.

28. (Original) A method of depositing a material on a plurality of microfeature workpieces held in a spaced relationship within an enclosure of a processing system, the enclosure including a first precursor gas and having a first enclosure pressure, the method comprising:

reducing pressure within the enclosure to a second enclosure pressure that is less than the first enclosure pressure, the processing system having a base pressure and a difference between the second enclosure pressure and the first enclosure pressure being at least 90% of the difference between the base pressure and the first enclosure pressure;

after reducing the pressure within the enclosure to the second enclosure pressure, introducing a flow of a purge gas into the enclosure and increasing the pressure within the enclosure to a third enclosure pressure, the third enclosure pressure being greater than the second enclosure pressure; and

after increasing the pressure within the enclosure to the third enclosure pressure, introducing a flow of a second precursor gas to the enclosure with the

pressure within the enclosure at a fourth enclosure pressure, a difference between the third enclosure pressure and the fourth enclosure pressure being about 0-10% of the fourth enclosure pressure.

29. (Original) The method of claim 28 wherein the fourth enclosure pressure is approximately equal to the first enclosure pressure.

30. (Original) The method of claim 28 wherein the third enclosure pressure is approximately equal to the fourth enclosure pressure.

31. (Original) The method of claim 28 further comprising, after introducing the flow of the second precursor gas:

terminating the flow of the second precursor gas; then

reducing pressure within the enclosure to the second enclosure pressure; and then

introducing a flow of the purge gas and increasing the pressure within the enclosure to the third enclosure pressure.

32. (Original) The method of claim 28 further comprising, after introducing the flow of the second precursor gas:

terminating the flow of the second precursor gas;

reducing pressure within the enclosure to a fifth enclosure pressure while introducing a flow of the purge gas, a difference between the fifth enclosure pressure and the first enclosure pressure being at least 90% of the difference between the base pressure and the first enclosure pressure and the fifth enclosure pressure being different from the second enclosure pressure; and

introducing the purge gas to the enclosure and increasing the pressure within the enclosure to a sixth enclosure pressure, a difference between the sixth enclosure pressure and the fourth enclosure pressure being about 0-10% of the fourth enclosure pressure.

33-42. (Cancelled)